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ART. VI.—*Observations on the History of the Cure of Popliteal Aneurism by Compression.* By THE EDITOR. With Cases by the late CHARLES H. TODD, Professor of Anatomy and Surgery to the Royal College of Surgeons in Ireland; SIR PHILIP CRAMPTON, Bart.; J. W. CUSACK, V.P.R.C.S.; R. ADAMS, A. M., M. D.; and PROFESSOR HARRISON.

THE following cases having been placed in our hands by Sir Philip Crampton, Mr. Cusack, Mr. Adams, Dr. Robert Todd, of King's College, London, and Dr. Harrison, of the University of Dublin, we present them to our readers, together with such information, bearing upon the history of the cure of aneurism by compression in Ireland, as the literature of medical science affords, or as we have gleaned by conversing with those who are more familiar with the subject than ourselves, or who were eye-witnesses of those successful cases on which the present mode of treatment has been founded.

We have been induced to enter into the merits and details of this matter in the present form of an editorial article, at the suggestion of some friends who were anxious to have put forward in their true light, the just and honest claims of those who were entitled to merit for the introduction and practice of this most important improvement in surgical practice; and as far as in us lies we shall endeavour to set our readers and the professional public right with regard to a discussion still unconcluded in these kingdoms. This is a duty incumbent upon us as journalists; and not having been engaged in the treatment of any of these cases ourselves, we think we are, or at least we should be, the less likely to be swayed by influences or partialities that few among us are entirely free from. Moreover, we think that, as the entire merit of this invention is due to the surgeons of this city, it is from an Irish periodical that the true statement should come.

We do not propose to enter into the history of all the cases that have been treated, nor to entertain at any length

the question of the *modus operandi* of the cure. Mr. Storks, of London, when recording two successful cases of his own, in the *Lancet* of the 23rd of May last, published a table exhibiting (with the exception of Mr. O'Ferrall's)(a), all the cases which have lately appeared in the journals,—by whom the pressure was applied,—the seat of the disease,—the time occupied in the treatment,—the result, and other matters of minor detail: and Mr. Storks acknowledges, in conclusion, that “the profession is much indebted to the Dublin surgeons for the introduction of a practice which promises, in many instances, to supersede an operation which in the best of hands has proved too often fatal.”

The first case which was treated successfully in this country, of late years, was that of Michael Duncan, who was cured of popliteal aneurism in the Richmond Hospital, by Dr. Hutton, between the 3rd of October and 27th of December, 1842; and this case, together with one by Mr. Cusack, and another by Dr. Bellingham, were related at the meeting of the Surgical Society on the 22nd April, 1843. The two former of these were published in the sixty-eighth Number of our former series (pp. 364–9), which was in circulation before the end of that month; and this was the *first* notice that appeared in print of these cases. Dr. Bellingham's was not reported till some days after. In describing his case, Dr. Hutton says: “The patient being reluctant to undergo the operation, I resolved to try compression of the femoral artery; and I entertained some hope of success from being informed by Mr. Adams that the late Mr. Todd had succeeded in a similar case, of which no account has been published.”

Mr. M'Coy also acknowledged the priority of Mr. Todd, in a communication which he made to the Surgical Society, on the 8th of April, 1843, relative to a case treated many years ago by Mr. Duggan, to which we shall presently refer.

(a) Dublin Hospital Gazette, October 15, 1845.

Immediately following Dr. Hutton's communication in our Journal, is another to the same effect, by Mr. Cusack, of a man cured of a popliteal aneurism by the like means, in Steevens' Hospital, in January, 1843; in detailing which to the Surgical Society, Dr. Fleming stated that Mr. Cusack was induced to put this mode in practice from his remembrance of the favourable result of a case treated successfully by compression by the late Mr. Todd. In our next Number, that for June, 1843, we published the first essay upon this method of treatment, afforded us by Dr. Bellingham, to which paper we refer our readers for a very admirable *resumé* of the history of compression, and also notices of all the instruments then employed to effect that purpose. In this account, Dr. Bellingham says: Richerand in the second volume of the *Dictionnaire des Sciences Medicales*, "has related, perhaps, the earliest case of this kind: it was that of a grocer in Paris, the subject of popliteal aneurism, who, by preserving the recumbent posture for twelve months, restricting himself to a low diet, with a bleeding once a month, and at the same time compressing the artery in the thigh by means of an instrument, constructed on the same principle as a truss, was perfectly cured." About the year 1817, the Baron Dupuytren is said to have cured a case of popliteal aneurism by pressure; but Mr. Adams, who witnessed it, informs us that it did not turn out successfully. At page 463 of his essay, Dr. Bellingham also states: "The late Mr. Todd, some years ago, successfully applied compression by an instrument different from any of those alluded to, in one case of popliteal aneurism."

Our readers are, no doubt, well aware, that the idea of curing an aneurism by compressing the artery in which it occurs, between the heart and the sac, is neither an entirely novel procedure, nor confined to the practice of continental surgeons. Speaking of the dangers attending the Hunterian operation, Sir Philip Crampton in his truly practical essay upon aneurism, published in the *Medico-Chirurgical Transactions*, in 1816, says: "All practical surgeons will admit that

they look with anxiety for some means of averting dangers, the reality of which they have but too often had reason to lament. Accordingly we find Mr. Hunter himself, Sir Everard Home, Sir William Blizard, and several other distinguished surgeons, both in these countries and on the Continent, endeavouring by various contrivances to *compress the artery from without*, with a view of taking off the force of the circulation from the sac, *without inflicting any injury on the diseased vessel*. Their attempts, however, have not been attended with success, and the causes of failure are too well understood to render it necessary to insist upon them in this place." And that compression was tried, even in this city, so early as 1815, we learn from the following paragraph in the essay from which we have just quoted:—alluding to a patient of Mr. Dease's, labouring under popliteal aneurism, Sir Philip says, "A few days before Mr. Adrian had, by a contrivance similar to Sir W. Blizard's, endeavoured to *compress the artery from without*; but by no force that could be borne was he able to stop the pulsation at the ham,—the attempt was therefore abandoned. The operation was performed by Dr. Dease, at 12 o'clock, on Monday, the 27th February"^(a).

What we are, however, anxious to establish is, that *the first successful case of popliteal aneurism treated by compression in these countries, was in the practice of the late Mr. Todd*.

At the meeting of the British Association held at Cork, in 1843, Professor Harrison recorded a case of popliteal aneurism cured by compression, to which, as there are some points of interest connected with it which have not been made public, we shall presently allude, but in which communication he distinctly stated his conviction of the then popular mode of treatment being but the revival of that proposed and successfully carried out by the late Mr. Todd.

At a discussion which took place at the Surgical Society

(a) Medico-Chirurgical Transactions, vol. vii., part 2, pp. 352 and 368; see also John Bell's Principles of Surgery, for an account of the various instruments then in use for arresting hæmorrhage, and compressing arteries.

in January last, on the subject of the cures effected by Messrs. Hutton, Cusack, and Bellingham, Mr. Adams, to whom much credit is due for his steady and determined advocacy of the claims of Mr. Todd, mentioned the case successfully treated by that gentleman, twenty years ago; and we had, in common with many others in this city, a traditional knowledge that the entire merit was due to that distinguished surgeon: and this opinion was confirmed by conversing on the subject with Sir Philip Crampton, Mr. Cusack, Mr. Adams, and others, who had personal recollections of the cases treated by Mr. Todd,—while, on the other hand, it has been asserted that the honour of first advocating “*the principle*” of the operation was due to Dr. Bellingham.

Under these circumstances, we communicated with Dr. Robert Todd, of London, on the subject, and have received from him the interesting document which will be found further on; but before inserting it, we would call the attention of our readers to the late Mr. Todd’s Essay on Aneurism, published in the third volume of the Dublin Hospital Reports, in 1822. In the third case there related (page 121), he resolved to try the effect of pressure on a recent popliteal aneurism, in June, 1820. This case bears so forcibly on many of the points at present under discussion as to the treatment of aneurism by pressure, that we here transcribe a portion of it.

The patient, a man aged 30, was directed to remain in a horizontal posture, was put on low diet, and occasionally bled and purged. “The tumour was so much under the control of pressure on the inguinal portion of the artery,” writes Mr. Todd, “that I was not altogether without hope that, *by diminishing the current of blood in the trunk of the artery, so as to favour the coagulation of the contents of the sac, a cure without operation might be effected*; at all events, it was obvious that by giving time to the collateral arteries to be dilated, the success of the operation would be rendered less uncertain.

“At first it occurred to me that the object I had in view

might be attained by the application of a tourniquet in the ordinary way to the upper part of the thigh; however, the pressure made by the circular strap of that instrument on the small vessels of the limb being an objection to its use, I constructed an apparatus resembling a common truss for femoral hernia, the spring of which was much stronger, and the pad longer, of a more oval form, and more firmly stuffed, than in the truss. The pad of this instrument was furnished with an inner plate of iron, which was connected with the outer iron plate by means of a hinge close to the junction of the outer plate with the spring, and a tourniquet screw passing through this plate had the effect, when turned, of making a greater or lesser degree of pressure with the pad, on the part to which it was applied.

“This instrument was put on like a common truss, the pad being placed in the line of the crural artery, immediately below Poupart’s ligament, and it was effectually kept in its situation by a soft strap of chamois leather, which passed from the spring of the truss behind, on the inner side of the thigh, and buttoned in front on the outer plate of the pad. With this contrivance I possessed full power over the circulation in the femoral artery, at the same time that the collateral arteries suffered little or no compression. The principle of the instrument and the object for which it was employed were explained to and easily comprehended by the patient himself, so that he was enabled to regulate the degree of pressure according to his sensations. After a trial, however, of several weeks, he could not be persuaded that the plan adopted was productive of benefit. *During this period the tumour had obviously diminished, and its contents had acquired a firm consistence*; but the patient complained that the instrument gave him much pain, and that his health and spirits had suffered materially from confinement, rigid abstinence, &c. The operation was accordingly agreed to, and I performed it on the first of September, being two months after his admission into the Hospital.”

From a careful examination of this case, we learn that Mr.

Todd was perfectly acquainted with the *principle* of the operation; and, in truth, although Mr. Todd was not himself aware of the fact, this case, we have every reason to believe, would have been, or even then was, a successful one, and would have perfectly recovered by means of the process then set up in the aneurism without the usual operation of tying the artery being resorted to; for we now know that the establishment of the collateral circulation, the diminution of the tumour, the lessening of the pulsation in it, and its acquiring a firm consistence, are proofs that the cure has been, to use a common expression, "set a going," and that nature will, under the most unfavourable circumstances, complete the cure, after the coagulum has taken place, though some pulsation may still exist in the tumour. This valuable fact was first made known to the profession by Professor Porter, in his article on aneurism in the last Number of this Journal; it has been lately proved in two or three instances; and the case afforded us by Mr. Cusack, to be detailed presently, is conclusive on the point.

The following case has been afforded us by Mr. Adams:

"James Searlett, æt. 33, formerly a revenue tide-waiter, but then living on a pension, applied to Dr. Duggan, the revenue surgeon, in July, 1824, to be treated for a femoral aneurism of the left leg, situated just two inches below Poupert's ligament. Mr. Hayden and Mr. M'Coy, who were pupils of Dr. Duggan, and also myself, attended this man, and the following particulars of the early history of this case I now adduce, principally from my own note-book, and from information which Mr. Hayden and Mr. M'Coy have severally supplied. In my own case-book I find the following note: 'When James Searlett first consulted the revenue surgeon, he was twenty-seven years of age, and an acting tide-waiter in the revenue. In the month of March, 1818, he had a popliteal aneurism, for which he never had medical advice, until one day, while he was wrestling with another revenue officer, he fell, and at that moment the popliteal aneurism became diffused.'

“Mortification of the foot set in, and Dr. Duggan, assisted by myself, Mr. Shekleton, Mr. Owen, Dr. Hayden, and Mr. M'Coy, performed amputation of the thigh four inches above the knee. In July 1824, that is, in six years after the amputation, an aneurismal tumour appeared in the femoral artery, about the size of a hen's egg, situated at the distance of two inches below Poupart's ligament, in the femoral artery of the stump.

“There could not be a much more unpromising patient than this: he had already shewn his predisposition to aneurism, and both before and since his limb had been amputated, had led a most intemperate and dissipated life. When the femoral aneurism appeared in the stump, I frequently examined the tumour, which was situated exactly two inches below Poupart's ligament; it had the usual signs of aneurism, and it is to be observed that it had a strong diastolic pulsation; it was gradually increasing when the treatment by compression was resorted to. This case seemed a peculiarly appropriate one for such treatment, and unsuited for any other; the dissipated habits of the man, and the situation of the aneurismal tumour, were circumstances which would have rendered any operation peculiarly hazardous. Dr. Duggan therefore gladly adopted the proposal of Mr. Todd, contained in the Dublin Hospital Reports, and determined to give a trial to the aneurismal truss, which, says Mr. M'Coy, ‘I was directed by Dr. Duggan to apply to the femoral artery, above the aneurismal tumour. Mr. Todd had the kindness to lend his own apparatus, and I put it on.’ Mr. M'Coy tightened the screw until all pulsation ceased. Next day, he adds, ‘I found him easy, and there was no return of pulsation. The tumour in three weeks became solid, and diminished in size, and he was perfectly cured.’

“The man lived twenty years after the cure of the aneurism, and suffering much from the effects of the idle, dissipated mode of life he had adopted. During this period he lived occasionally with his brother, who resides near me, and I had frequent opportunities of seeing him; he complained occasionally of rheumatism in the right hip joint, as if it had suffered from

too much weight being thrown on it, in consequence of the left leg being amputated. In the year 1842 he was a patient of mine in the Richmond Hospital, under treatment for rheumatism. I then directed the attention of the class to his case, and related the remarkable facts which I have now detailed.

“Since he was discharged from the hospital, I seldom have seen him, but I learned from his brother, that he died on the 17th September, 1844. He also told me that his death was caused by his intemperate habits; and that, therefore, he never had medical advice for him. I had no opportunity of knowing his condition for the last year of his life, or of seeking or obtaining leave to make a *post mortem* examination, which I regret.”

The instrument used by Mr. Todd is figured in the Dublin Hospital Reports (vol. ii. p. 123); but Mr. Cusaek informs us that Mr. Todd, with whom he frequently conversed upon the subject, subsequently contrived another apparatus, consisting of a padded splint, into which the thigh fitted, and to which was attached a hoop, which passed over the limb, whilst to this latter was affixed a serew-stem, connected with a pad to press upon the vessel. With this instrument it has been reported that Mr. Todd completely cured a case of popliteal aneurism; but although the fact was testified to by Sir Philip Crampton, Mr. Cusaek, Mr. Adams in particular, Dr. Robert Smith, and Dr. Williams, yet as the case had not been published, Mr. Todd's merits do not seem to us to have been fully admitted, although it is but just to say, that no one, in print at least, claimed to himself the honour of the discovery.

The following document is, however, conclusive: it was originally intended for publication in the Dublin Hospital Reports, of which the late Mr. Todd was an editor, along with Drs. Colles and Cheyne; but Mr. Todd's death very shortly after the case occurred, and before the appearance of the fourth volume of that work, caused the delay which has since taken place. It remained in the hands of the late Professor Colles till a few years ago, when it was returned to Dr. Robert Todd, to whom we are now indebted for it.

“Patrick Murtagh, aged 36, a strong athletic man, of rather intemperate habits, by occupation a labourer in a brewery, was admitted into the Richmond Surgical Hospital on the 5th of September, 1825, for an aneurism in the right ham. He does not attribute its formation to any particular cause; says he never received any hurt in the limb, but that he is exposed to much hardship and labour, and is constantly employed carrying barrels of beer up very steep steps.

“The aneurism is about the size of a turkey’s egg; it lies across the popliteal artery, and extends laterally under the ham-string tendons, so that, by looking at the front of the thigh, it can be seen pulsating on either side. Its contents seem to be fluid, as, by making pressure on the sac, its size can be much diminished. The pulsation is easily commanded by pressure on the femoral artery below Poupart’s ligament.

“He states, that about fourteen days previous to his admission he perceived a stiffness in the ham after walking a short distance into the country; on returning home he examined the part, and could perceive nothing but a little puffing in the skin; conceiving he had strained the joint, he paid no attention to it, and continued working as usual for some days, till the stiffness increased so much as to cause great inconvenience in moving the limb. At this time he perceived a small tumour in the ham, which, when pressed on, gave him pain, and throbbed violently. Still thinking it proceeded from a strain, he applied stupes and soap liniment; but perceiving its size increasing rapidly, he became uneasy, and consulted an apothecary, who immediately directed him to the hospital.

“On his admission he was ordered to keep his bed, and have a dose of the purging mixture of the hospital.

“Thursday, 8th. Complains of headach; tongue white; pulse, 100. V. S. ad $\frac{3}{4}$ xii. Mist. purgans.

“17th. The tourniquet truss was applied at 12 o’clock; which perfectly commanded the pulsation of the tumour, but it returned in two hours after the application of the truss;

in the evening it was screwed tighter; pulsation ceased but for one hour.

“18th. The instrument not appearing to fit, was removed, and sent to be altered.

“21st. The instrument was again applied (it appeared to answer perfectly), and was kept on till 8 o'clock, P.M., when it was removed, as the man could no longer bear the pressure; the pulsation in the sac less violent.

“Thursday, 22nd. The instrument was applied at twelve o'clock, and continued till Saturday, 24th. The pulsation of the tumour has entirely ceased. Pressure was applied on the tumour by graduated compresses and a roller, wetted in a solution of muriate of ammonia.

“25th. The instrument was not applied yesterday (through mistake); however, there is no pulsation in the tumour. It was applied on the morning of the 25th, and remained on till Tuesday, 27th, when it was removed entirely.

“28th. No pulsation; tumour is diminishing.”

This then was the second successful case during the lifetime of Mr. Todd. It was transcribed from the note-book of Dr. Connor, and is in the handwriting of Mr. Nunn, to whom we presented it, and who has furnished us with the following testimony:

“6, *Dawson-street, June 29th, 1846.*

“The report of the case of Patrick Murtagh, who was a patient in the Richmond Surgical Hospital, in the year 1825, under the care of the late Mr. Todd, is in my handwriting.

“I perfectly recollect this case, which occurred during the time I was an apprentice at the hospital; the cure was complete and permanent. I have latterly lost sight of this patient, but for some years I saw him frequently: the last time I saw him he was quite free from any trace of his former disease.

“R. L. NUNN.”

And on the 1st of July, Dr. Connor of Battersea writes:

“ I have a perfect recollection of the man, and of his calling at the Richmond Hospital three or four months after he had been discharged, and of his being exhibited to the class, and considered by all who saw him as being perfectly cured. No trace of the aneurism remained; but there was a small tumour in the ham unaffected by pulsation, and the pulsation in the tibial arteries was undiminished.”

Professor Todd died in March, 1826, and so the matter rested, as far as any practical result was concerned, till *revived* by Mr. Hutton, in 1842. And here we feel it our duty to say, that but for this successful case of Mr. Hutton's, and those following immediately upon it, under the care of Messrs. Cusack, Bellingham, and Harrison, it is more than probable that the treatment of aneurism by compression would now be in the same state it was six years ago. Mr. Cusack informs us that shortly after the cure of Mr. Todd's case, he was lent the instrument employed, and tried it on a case in Steevens' Hospital, in the early part of 1826, but as the subject of it was very impatient and bore the pressure badly, he performed the usual operation, and the man recovered.

We now arrive at the year 1830, when Sir Philip Cramp-ton again took up the matter, although in a somewhat different light; he has furnished us with the following communication:

“ *Merrion-square, July 4, 1846.*

“ DEAR SIR,—Agreeably to your desire, I send you my notes (imperfect as they are) of a case of femoral aneurism, which was treated by *immediate* compression of the artery at the groin, in the Royal Military Infirmary, Phoenix-park.

“ Corporal Coulson, aged thirty-six, was admitted into the Infirmary in the autumn of 1830, with a large femoral aneurism, which occupied the upper third of the thigh; the greater part of the contents of the aneurismal sac were fluid; there was but little pain in the limb, but he complained of severe pain in the chest, shooting back to the shoulder-blade; on ex-

amination with the stethoscope, a very suspicious *bruit* was heard at the back of the thorax, rendering the existence of aneurism of the aorta but too probable.

“In such a case, ligature of the external iliac was not to be thought of, as the co-existence of thoracic with femoral aneurism too clearly proved a condition of the arterial system, the most unfavourable that could be imagined for the operation. I determined, therefore, to try if the coagulation of the blood in the aneurismal sac could be effected by compressing the femoral artery at the point where it passes over the pubis. The constant failure which had attended the attempts to compress the femoral artery above the aneurism, by means of tourniquets of various construction, even in the hands of the most eminent surgeons, was anything but encouraging; relying, however, on the experiments of Hunter and Freer(*a*), and those which I have detailed in the *Medico-Chirurgical Transactions*(*b*), which seem to establish that ‘a very moderate degree of irritation applied to the external coat of an artery, aided by a sufficient degree of compression to bring its internal surfaces into contact, is sufficient to effect the obliteration of its canal,’ I determined to try the effect of the *immediate* compression of the artery, by means of a compress, without the aid of a ligature. An apparatus was accordingly constructed, by means of which pressure, regulated by a screw, was brought to bear on the artery, which was previously laid bare to the extent of about half an inch(*c*).

“The operation was performed in the presence of Professor Colles, Mr. Cusack, and several other surgeons, civil and military. The immediate effect of the compression of the artery was to stop the pulsation in the aneurism and to diminish its

(*a*) *Observations on Aneurisms*, p. 14. (*b*) *Med.-Chirurg. Trans.* vol. xvi., p. 345.

(*c*) This apparatus, improved by Mr. Daly, was successfully applied in the first case of popliteal aneurism treated by Mr. Cusack in 1843; it is figured and described by Dr. Fleming, in the *Dublin Medical Press* of the 3rd of May, 1843.

bulk; pulsation, however, soon returned, but was easily commanded. The resident staff assistant-surgeon, aided by the hospital sergeants, took charge of the case, increasing the pressure on the artery when the pulsation in the aneurism returned, and relaxing it when the pain became intolerable. In this way the current of blood through the aneurismal sac was occasionally arrested completely, and at all times was materially obstructed. At the expiration of forty hours the pain from the pressure became so severe that it was thought advisable to remove the apparatus and to substitute a firm linen compress about two inches thick, which was secured by means of a tightly applied spica bandage; this degree of pressure was attended with no pain, but it did not completely suppress the pulsation. The bandage was tightened from time to time, and from day to day the pulsation became less distinct; and when I examined the man after an interval of three days, that is to say, six days after the operation had been performed, I found, to my great surprise and delight, that all pulsation in the sac had ceased, and that the aneurism had lost nearly one-half of its bulk. The bandage and compress were worn (as a measure of precaution) for a week longer, and were then removed altogether. Things went on in this satisfactory state, when, on the morning of the fifteenth or sixteenth day, the soldier who slept in the neighbouring bed was awoken by 'a loud gurgling noise' which proceeded from the man who had been operated on; he got up and raised him in the bed, which was deluged with blood, but he was quite dead,—the thoracic aneurism had burst into the trachea.

“On examining the parts concerned in the femoral aneurism, it was found that the artery was pervious as far as the sac, which was filled with a soft coagulum of an intensely dark colour generally, but of a bright arterial colour towards the centre, and here the coagulum seemed to be of very recent formation; a portion of it about half an inch in length passed into the lower or distal part of the artery.

“The remarkable success which of late has attended the treatment of popliteal aneurism by the ‘*mediate compression*’ of the femoral artery above the sac, entitles this operation to be considered as a means of cure, which, if not universally, is at least generally applicable to such cases. There are cases, however, of external aneurism,—the axillary and carotid, for example,—in which this mode of treatment cannot be employed, for it is well-known that a degree of mediate compression, which would be sufficient to arrest the current of blood through the subclavian artery, could not be endured for ten minutes, and the same is true of the common carotid. I am by no means so certain, however, that *immediate* compression, if applied to the subclavian artery at the point where it passes over the first rib, and effected in the manner described in the following case, might not be employed with success.

“A dragoon, about 35 years of age, and apparently of a good constitution, suffered from popliteal aneurism of six months’ standing; he was received into the Royal Military Infirmary in the summer of 1830, and, after the usual course of preparation, the artery was tied with a single silk ligature at the usual place, in the presence of Mr. Cusack, Professor Porter, and several other surgeons. Several cases of secondary hæmorrhage after operations for aneurism having occurred in the course of the year, in consequence of the giving way of the artery at the place of the ligature^(a), I determined to try how far such an occurrence might be prevented by drawing the noose of the ligature no tighter than was necessary to arrest the current of the blood without dividing the inner and middle coats of the artery; the ligature was accordingly closed slowly, while one of the assistants placed his hand on the aneurism. The moment he announced that “the pulsation had ceased,” the noose was secured by a second knot. The man expressed no pain during the slow closure of the ligature. About an

(a) See Guattani de Wocamaslaus on Aneurismal Surgery, Med-Chirurg. Trans. vol. vi. p. 350.

hour after the operation, an obscure pulsation could be detected in the aneurism: it was attended with this remarkable circumstance, that when the horizontal posture was observed the pulsation ceased; but when the body was made to form a right angle with the lower limbs it immediately returned, a circumstance easily accounted for by the different degrees of tension to which the artery was subjected, in the different angles formed by the pelvis on the thighs, in the recumbent and sitting postures respectively. Obscure pulsation continued to be felt in the aneurism for ten days; after the expiration of this time it ceased altogether. On the sixteenth day the ligature, which hung loosely from the wound, was removed, and within an hour afterwards there was a smart arterial hæmorrhage from the hole which had been occupied by the ligature. On arriving at the hospital, I found that the resident surgeon had stopt the hæmorrhage, by pressing his finger on the bleeding orifice. I immediately formed a rolester, consisting of the hospital sergeant and six men, selected by him from the patients in the ward; they were instructed as to the manner which the compression was to be applied; and the resident surgeon undertook, at each relief of the guard, to press the femoral artery against the pubis, until the compression at the wound had been perfectly adjusted; an efficient pressure was, by this means, maintained for upwards of forty hours. It was then gradually withdrawn. The bleeding never returned, and the man returned to his duty in a month.

“I cannot conclude this very hasty and imperfect notice, without expressing my strong conviction that manual pressure may, under due regulation, be advantageously substituted in many cases, not only of wounded artery, but of aneurism, for the ligature or for the best constructed instruments for effecting mediate compression.

“I remain, dear Sir,

“Your’s faithfully,

“PHILIP CRAMPTON.”

Here we beg leave to remark that the practice of tying arteries for secondary hæmorrhage has been for many years on the wane in this city. While resident in Steevens' Hospital we happened to be standing in the ward on three different occasions when the brachial artery sprung, after an operation, at the bend of the elbow. The practice taught in the hospital was immediately had recourse to: the dressings were removed from the part, and pressure made with the finger directly on the bleeding vessel; a corps of attendants was then organized, and immediate compression upon the artery kept up by the finger, with the intervention of a small piece of prepared sponge, for the next twenty-four or thirty-six hours, and with complete success. Two of these cases were under the care of Mr. Cusaek, and one under the late Professor Colles. Many other similar instances will be remembered by the former students of Steevens' Hospital.

The instruments used by Messrs. Todd, Crampton, Hutton, Cusaek, and Bellingham, are now pretty well known to the profession, and it is not the object of this paper to describe them, or the many other ingenious contrivances and improvements by various members of the Profession, Mr. L'Estrange in particular, as well as those adapted by the instrument-makers, Mr. Read and Mr. Milliken. All these, however, were more or less defective, *inasmuch as they applied the pressure on but one point*; and few persons will be found who have patience and fortitude enough to bear it in this way for a sufficient length of time to cause such a diminution in the calibre of the vessel as will permit of the formation of a clot in the aneurismal sac. This difficulty was, however, obviated by a patient treated by Professor Harrison, who contrived for himself an apparatus, by which the pressure could be *applied on several points in the course of the artery*, and so relieve the distress and pain (which is, in many instances, scarcely supportable), by altering the pressure from one point to another in succession, during the process of cure. Professor Harrison gave a history of this case at

the meeting of the British Association, held at Cork, in August 1843: some brief notices of which appeared in the local newspapers, and in the *Athenæum*, at the time; but as the case has never yet been properly recorded, and as there are some points in its history of great practical importance, we here insert an abridgment of it, from the manuscript kindly afforded us by Professor Harrison.

Robert Hoey, aged twenty-nine, a carpenter, of great intelligence, and of temperate and regular habits, was admitted into Jervis-street Hospital, with popliteal aneurism of about a month's standing, on the 9th of May, 1843. It being deemed a proper case in which to try pressure, the usual instrument then in use, consisting of a padded splint, with a circular hoop, holding the stem of a pad which compressed the vessel where it passed over the ramus of the pubis, was applied. The pain experienced from this, when tightened so as to stop the pulsation, was so great, that he was unable to bear it for more than an hour at a time. Several ineffectual attempts were made to keep up the pressure by means of this apparatus, but it never could be endured for more than the period just specified, when it was loosened on account of the pain, and after a few minutes re-applied.

On the 12th, it is reported that the tumour was somewhat harder and smaller than on admission, but no sensible effect had been produced on the pulsation. After this he took small doses of the tincture of digitalis morning and evening, and was kept on very low regimen.

On the 13th some œdema was visible on the front of the leg; the pressure continued as usual at intervals; he complained greatly, not only of the pressure of the pad upon the artery, but of the inconvenience of the posterior splint. Matters went on in this way till the 18th, when, a slight abrasion being perceived on the point of pressure in the groin, the instrument was removed, and applied about four inches below the pubis.

During the next four days he complained greatly of loss of rest, which even an opiate failed to procure.

On the 22nd a swelling presented itself on the outside of the knee, about the size of a nutmeg, painful to the touch, and evidently communicating with the aneurismal sac.

At this period the sudden increase of the tumour, the great loss of rest, the inability of bearing the pressure, the irritability, and the evident sinking of the patient's health, was such as induced Dr. Harrison, in consultation with the other surgeons of the hospital, to determine on the performance of the usual operation. The next day, however, the patient was better in every respect, and for the time it was abandoned.

On the 23rd the instrument was removed to its original position, but little progress was made in arresting the pulsation or diminishing the tumour; the pain was complained of as intolerable; he was unable to bear the instrument pressed home for more than one hour at a time; and was exceedingly restless, irritable, and feverish. The instrument was completely removed on the 27th, and that of Mr. L'Estrange applied on the 29th; and thus the treatment was continued during the entire month of June. Several instruments were tried, but none of them could be borne for a sufficient length of time to make any material or permanent change in the aneurism. On the 4th of July the patient was obliged to leave the hospital, owing to the death of a relative, but was allowed to take the instrument with him, with the intent and mode of application of which he was perfectly familiar.

On his return home, having reflected upon the cause of failure, which he naturally attributed to his having being unable to bear the pressure on the artery at the pubis, he invented, and immediately applied, a very simple instrument, on the principle of the carpenter's clamp, consisting of a small, well-padded iron splint, four inches by three, connected with a steel bow, in the front of which worked a screw, furnished with

a pad, with which he could compress the artery in any part of its course on the anterior or inner part of the thigh. He at once applied two of these, the upper compressing the vessel about three inches below Poupart's ligament, the lower about the middle of the thigh, but each of them capable of being shifted occasionally, as the point of pressure became tender. With these he completely commanded the circulation for upwards of twenty-four hours. As soon as the upper caused much pain, after an hour or so, he tightened the lower one, and relaxed that above, and so alternated from one to another, always making sure that the circulation was fully commanded, by one instrument being screwed down, before he loosened the other. He had thus the satisfaction of completely effecting his own cure; but, fearful of any return, he wore the clamps even outside his trousers for a considerable time afterwards.

We examined this man on the 1st of last month, along with Sir Philip Crampton, and we can state that the cure remains most perfect; there is still some fulness in the ham, but he follows his occupation, and walks about as well as ever, and does not complain of any sensation in that limb more than in the other. Although this man owes much to Professor Harrison, who commenced his treatment and cure, he certainly achieved for himself, personally, a great good, and for science a very valuable improvement. The weight used by Dr. Bellingham is somewhat to the same effect, and appears to us a very meritorious invention, though not equally effective with the clamp.

The following case has been placed in our hands by Mr. Cusack, who treated it a few months ago in Steevens' Hospital. The reports from which we extract have been drawn up by Dr. Molloy himself, and by Mr. Harris, who had charge of the case while in the hospital:—

W. H. Molloy, M.D., aged thirty-three, a practitioner in the county of Donegal, of strong, athletic make, sallow complexion, dark hair and eyes, energetic in character, but impatient of pain. Has been accustomed to take a great deal of horse

exercise in the performance of his duties, in an extensive district; has enjoyed good health, with the exception of periodic attacks of rheumatism, several of which terminated in effusion into one or both knee joints. On more than one occasion a tumour, the size of an egg, was perceived in each popliteal space after a rheumatic attack: it was elastic, free from pulsation, and always disappeared as the rheumatic effusion went off(a.)

On the 9th of February, 1846, he was seized with pain in the right knee, which he supposed to be the forerunner of one of his usual rheumatic attacks; but it was accompanied with coldness of the limb, and numbness about the great toe. On the 10th all these symptoms were increased; the superficial veins had also become greatly distended, and the foot had assumed a livid colour. 11th, a tumour the size of a small orange, soft, compressible, circumscribed, and pulsating synchronously with the heart, was discovered in the right popliteal space; its pulsation could be arrested by pressure on the femoral artery in the groin. The true nature of the case was then manifest; and on the 27th of the month, Dr. Molloy placed himself under the care of Mr. Cusack, who had him provided with an apartment in Steevens' Hospital, in order that he might enjoy the advantages of the continued watching and attention so necessary in the subsequent treatment of any operation, and which can only be derived from the medical staff of a large hospital. It was deemed advisable to treat this case by pressure on the femoral artery, previous to the application of which, complete rest was enjoined, and he was put upon the use of tincture of digitalis and laurel water.

The hospital report of this date, after describing the tumour, states that when the limb was extended the size of the

(a) Mr. Adams has suggested to us that these popliteal swellings arose from the effusion in the joints spreading into sacs of the synovial membrane which protrude into that region, and have been occasionally mistaken for aneurism. See Mr. Adams's article on the Abnormal Condition of the Knee Joints in the *Cyclopædia of Anatomy and Physiology*.

tumour greatly increased, but that on flexion it became much smaller, and that the pulsation in the tumour was strong, but devoid of *fremitus* and unaccompanied by a *bruit*. There was no appreciable difference in the temperature of the limbs, nor any œdema present, and the pulsation in both tibial arteries was quite perceptible. The flexion power of the limb was so much impaired that he could with great difficulty ascend the stairs. The heart's impulse and sounds were normal.

On the second of March pressure with the clamp invented by Hoey, Dr. Harrison's patient, was first applied upon the femoral artery, at the junction of the upper and middle third of the thigh, so as to diminish without entirely impeding the current of blood through the artery, or causing the pulsation in the tumour to cease completely. He was not able to endure even this comparatively moderate pressure for more than ten minutes at a time on any one point of the course of the artery. Other instruments were tried next day but with the like effect. He suffered much, especially during the night from continual starting of the limb. On the 7th it is reported that he has borne the pressure very badly; the foot and leg have become œdematous, lessened in temperature, and painful. Pressure on the artery where it enters the Hunterian canal produces great pain and numbness down the limb, and can only be borne for a very short time. A comparatively slight amount of pressure applied upon the artery where it passes over the ramus of the pubis, completely controls the pulsation of the tumour, but owing to the presence of some enlarged glands in the groin, it cannot be long maintained. The startings in the limb continue; no material alteration in the tumour. On the 9th a circular instrument, consisting of a posterior pad, attached to a hoop, which went round the limb, on the front of which a sliding screw-pad was attached(*a*), was

(*a*) This instrument has been since very much improved by Mr. Read of Parliament-street, who made the screw stem to work through a ball and socket joint, by which means the pad is more accurately adjusted and kept more steadily in its place. He has also constructed a very ingenious compressing apparatus, which fits round the

applied, and this he bore for upwards of an hour with much greater ease than the former one, but at the end of that time it was obliged to be taken off in consequence of its producing both congestion and œdema. Late in the evening of that day it was re-applied and kept on for more than four hours; with this instrument he was able to turn on his side, which he was not capable of doing before, and he slept with more comfort than he had done since the commencement of his treatment.

On the 13th, the instrument was pressed down so as to stop all pulsation in the tumour, but this produced so much pain that it could only be borne for about twenty-five minutes at a time in any one position.

15th. There has not been much alteration in the tumour since last report, except a slight diminution in size, and a thickening of its walls. He still complains of the numbness round the knee: the œdema of the foot and leg have increased, and he now experiences a sensation of oppression in the region of the heart; he sleeps, and bears the instrument, however, much better than before. The artificial heat has been kept to the limb; and the tincture of digitalis continued.

22nd. He has become more reconciled to the instrument, and can now bear the pressure, especially below Poupart's ligament, for a considerable time. The tumour is in much the same state. Ice to be applied to it. 25th. The tumour has lessened in size, and become somewhat harder; two small vessels running parallel to each other can be detected pulsating on its surface. On this circumstance, writes Dr. Molloy, in his report, "I am inclined to think that the pulsation of these vessels might be mistaken for that in the tumour, which was perceptible after the screw had been pressed home, and the pulsation in the main artery had been arrested."

27th. Tumour and all the other symptoms as before, but on the removal of the instrument the pulsation returns.

pelvis, and has attached to it a moveable bow, furnished with a screw pad for applying the pressure on the groin, and capable of being adjusted to either side.

30th. The tumour has become smaller and harder than when its size was last noted, but its pulsation is still quite evident. The muscles of the thigh have become greatly reduced in size, and the slightest motion now displaces the pads. In order to examine the tumour, it is necessary to bury the fingers deep into the popliteal space. Since the last report the œdema has disappeared, and the starting has lessened. His general health is not so good as on admission, and he has, therefore, been allowed a more liberal diet, but the use of the digitalis has been continued. It was now determined to keep up uninterrupted pressure for another week, and after that, to relinquish it, even if the pulsation in the tumour had not completely subsided; moderate pressure was also applied directly over the tumour.

April 5th. Pressure has been kept up steadily, with a variety of instruments, since last report; but, except for a short time, they have not been pressed sufficiently tight completely to arrest pulsation in the tumour. The loss of rest is still greatly complained of; appetite very bad. 8th. Pressure almost insupportable; strength diminishing.

14th. Pressure discontinued altogether; a compress of sponge applied to the tumour, and retained in position by means of a bandage applied moderately tight over the entire limb. Allowed to sit up. 16th. It is found that the tumour has suffered a marked reduction in size during the past week, and has also become more solid; the pulsation, however, can still be detected in it. 24th. Left the hospital for Kingstown, where he remained to recruit his general health for the next fortnight, the tumour still continuing small and hard, but pulsating.

“On May the 12th,” writes Dr. Molloy, “I left Kingstown for the country, where I commenced walking about as usual, although lame, and my knee stiff and painful, up to the 22nd, when I ventured on horseback to pay a professional visit. During my ride it was with difficulty I maintained my seat, as the animal I rode was remarkably spirited. On making a sudden exertion, the knee, and particularly the

tumour, immediately became very painful, and the latter felt as if it had been stretched or torn. On my return home I removed the roller and compress, and found the tumour very tender to the touch, and increased in size, and I experienced a sharp lancinating pain shooting upwards in the course of the artery. At eleven o'clock that night the pain had become so great that I was obliged to take a full opiate, which procured me immediate rest. On awakening at five o'clock the next morning, I found the leg flexed on the thigh; the leg and foot cold, but the knee hot, and the collateral circulation fast establishing itself round the joint; the tumour hard and painful, *but perfectly free from all pulsation*. I remained perfectly quiet for three weeks, when the limb, which had been greatly wasted, and remained cold up to this point, began to increase in size and temperature. I am now, June the 27th, able to walk slowly for a mile or two without inconvenience, but when the pace is quickened, there is still pain of the leg and ankle, and stiffness of the knee. The tumour is much smaller, and can barely be felt deep in the popliteal space; there is no pulsation evident in either of the tibial arteries; motion of the limb much freer; temperature of the foot gradually increasing; general health very good. The greatest inconvenience which I experience is a disagreeable numbness along the inner side of the knee, leg, and foot, probably caused by some injury which the saphena nerve incurred during the process of applying the pressure."

Mr. Todd, in his essay in the Hospital Reports, has recorded a second case of popliteal aneurism, treated in 1820, in which he also applied pressure, together with depletion, even to a much greater extent; but he says the man "became impatient, and was unwilling to submit to a continuance of that rigid discipline which it had been thought expedient to adopt," so the artery was tied forty-five days after his admission into the Hospital(a).

(a) The Dublin Hospital Reports, vol. iii., p. 133.

In conclusion, we beg to present our readers with a tabulated arrangement of all the cases of femoral and popliteal aneurisms which have been treated by pressure on the femoral artery in Great Britain and Ireland.

| No. | Date. | Surgeon. | Locality. | Description of Aneurism. | Age of Patient. | Result. |
|-----|-------|------------------|---------------|--------------------------|-----------------|-----------------|
| 1 | 1820 | Mr. Todd, | Dublin, | Popliteal, | 30 | Fem. art. tied. |
| 2 | " | " | " | " | 27 | " |
| 3 | 1825 | " | " | " | 36 | Cured. |
| 4 | 1824 | Mr. Duggan, | " | Femoral, | 33 | " |
| 5 | 1826 | Mr. Cusack, | " | Popliteal, | — | Fem. art. tied. |
| 6 | 1843 | " | " | " | 55 | Cured. |
| 7 | 1844 | " | " | " | 26 | " |
| 8 | 1846 | " | " | " | 33 | " |
| 9 | 1830 | Sir P. Crampton, | " | Femoral, | 36 | " |
| 10 | 1842 | Mr. Hutton, | " | Popliteal, | 30 | " |
| 11 | 1843 | Dr. Bellingham, | " | " | 32 | " |
| 12 | 1844 | " | " | Femoral, | 35 | " |
| 13 | 1846 | " | " | Popliteal, | 40 | Doubtful. |
| 14 | 1843 | Mr. Liston, | London, | Femoral, | 30 | Cured. |
| 15 | 1844 | " | " | " | 53 | " |
| 16 | 1843 | Dr. Harrison, | Dublin, | Popliteal, | 29 | " |
| 17 | 1844 | Mr. Kirby, | " | " | 28 | " |
| 18 | " | Mr. Allen, | Haslar Hospl. | " | 32 | " |
| 19 | " | Mr. Greatrex, | London, | " | 27 | " |
| 20 | " | Mr. Porter, | Dublin, | " | 29 | " |
| 21 | 1845 | " | " | " | — | " |
| 22 | 1844 | Mr. Jolley, | Torbay, | " | 28 | " |
| 23 | 1843 | Mr. Harrison, | Bristol, | " | 42 | Fem. art. tied. |
| 24 | 1845 | Mr. Dartnell, | Chatham, | " | 38 | Cured. |
| 25 | 1846 | Mr. Mackern, | Litherland, | Femoral, | 30 | " |
| 26 | 1845 | Mr. Storks, | London, | Popliteal, | 32 | " |
| 27 | 1846 | " | " | " | 24 | " |
| 28 | 1845 | Mr. O'Farrell, | Dublin, | " | 32 | " |
| 29 | 1846 | " | " | " | 37 | " |

From this table it would appear, that twenty-nine cases of aneurism—six femoral, and twenty-three popliteal—have been treated by pressure upon the artery leading to the sac; of which number, nineteen occurred in Dublin; and that in four, the femoral artery was tied, chiefly from want of confidence in pressure, on the part of either surgeon or patient, and that in twenty-five instances this mode of treatment was successful. Mr. Todd's three cases, Sir Philip Crampton's case, Mr. Duggan's case, Mr. Cusack's case in 1826, and also that of Dr. Molloy, and Mr. O'Ferrall's two cases, have not been before introduced into any of the notices or tables of this operation which have

appeared in the periodicals. Dr. Bellingham's first two cases occurred in the same individual; his third I have, with his own permission, marked doubtful, because the patient died of erysipelas during the process of cure,—the subject of it was originally under the care of Mr Cusack. Mr. O'Ferrall's cases will appear at length in our November number.

Sir P. Crampton's second case has not been classed in the foregoing table, inasmuch as it was one of accidental hæmorrhage in which the pressure was resorted to from unavoidable necessity, and not originally employed as a means of cure; and Mr. Adrian's case, mentioned in the *Medico-Chirurgical Transactions*, has not been sufficiently detailed, to entitle its being placed in the foregoing category. The subject of Mr. Cusack's third case died suddenly of disease of the heart before he left the hospital—this, however, in no wise militates against the applicability of the treatment, even in that individual case. The man died *cured* of his aneurism, and the subsequent examination of the parts concerned in that disease was of vast importance in the explanation of the mode of cure. The propriety of applying pressure in this case has been questioned, and, we think, most unjustly. Had the usual operation of tying the artery been resorted to—an operation periling life—in such a case we do think the surgeon would be reprehensible. But it is well known that many persons with diseased hearts and diseased arterial systems, will live for years after the supervention of such; and are these persons to be allowed to die of the bursting of an external aneurism, when a perfectly bloodless procedure (for it is not an operation), and one, as far as we yet know, unaccompanied with any risk; together with rest; the use of the tincture of digitalis; a low regimen; and the preservation of the horizontal position for a fortnight or three weeks, may prolong their lives for years?

In ten instances, local pressure on the aneurismal tumour by means of pads and bandages was used in addition to the pressure by the instrument. We have omitted the column for the

“time occupied in the treatment before *bruit* and pulsation had ceased,” inserted in Mr. Storks’ table, because no fair standard can be at present established, nor any practical deduction drawn from it. The time has varied from ninety-one days to five; but an examination of the published cases, and even of some of those detailed in this paper, will shew how irregularly the pressure was applied; and it is quite apparent that its removal at a *particular time*, even for a few minutes, and allowing the flow of blood through the sac again to take place, will undo all that had been before affected. It is, moreover, very possible that in many instances the pressure has been continued far longer than was necessary. Should we not first apply a very moderate degree of pressure, so as to accustom the patient to bear it with comfort, and then gradually increase it to a particular point, when it is possible that the artery may have become accustomed to it, and the collateral circulation become increased; then put it down firmly for a few hours, and the cure may be so far accomplished that further pressure may be unnecessary? We would suggest to those engaged in the treatment of aneurisms by compression, or in the manufacture of instruments to effect that purpose, that an apparatus made sufficiently light and small, so as not to prevent the patient turning in bed, and provided with a number of pads (three at the least), adapted along the course of the artery, so that several points of pressure could be made in succession, would be a great desideratum.

Although we are but in the infancy of this very great improvement, yet from the foregoing observations, as well as what has been already published by others on the subject, the following conclusions may, we think, be drawn:

I. That numerous attempts have been made, during the present century, to cure external aneurisms, popliteal in particular, by means of pressure upon the artery between the sac, and the centre of the circulation; and that various instruments have been contrived to effect this purpose.

II. That by such means, it is more than probable that occasional cures were made.

III. That popliteal aneurism seems the most favorable for the application of pressure.

IV. That to Mr. Todd is due the merit of having first fairly tried, and successfully applied the pressure treatment of popliteal aneurism in these kingdoms.

V. That no permanent position was established for the treatment of aneurism by compression, until the cases treated by Mr. Hutton, Mr. Cusack, and Dr. Bellingham, were brought before the profession at the Surgical Society of Ireland, in 1843.

VI. That up to this period the instruments made to effect the compression were defective, inasmuch as they applied the pressure on but one point.

VII. That the improvement introduced by Dr. Harrison's patient, Hoey, of applying a number of clamps along the course of the artery, has done much to remedy this defect, and has afforded surgeons a very valuable hint on the subject.

VIII. That from the history of cases recorded by Professor Porter and Mr. Cusack, it would appear that it is not necessary, completely, to arrest the pulsation in the tumour, by pressure on the artery, in order to produce a cure.

IX. That this cure is effected by means of a coagulum formed in the sac, either by lessening the current of blood flowing through the artery, or by some peculiar power of coagulation imparted to the blood, aided by the contraction of the sac.

X. That in order to effect this coagulation, Galvanism has been employed, and appears to hold out hopes of success.

XI. That from dissections we learn, that it is not necessary to obliterate the artery between the point of pressure and the sac, in order to produce this coagulum, and effect a cure.

XII. That pressure has been tried, and produced coagulation, even when applied to the distal side of the sac.

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